CLAIMS

What is claimed is:

1. A polymer-containing catalyst comprising a compound having the molecular formula

$$(R^1—Y^1)_i— M —(Y^2—R^2)_j,$$

wherein:

each of i and j is an integer; $i \geq 0$; $j \geq 1$;

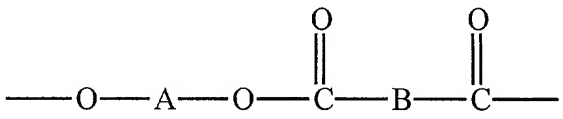
each R^1 independently is, or two or more R^1 groups taken together are, an alkyl group or an alkyl ether group each having between 1 and 20 carbon atoms;

each R^2 independently is a polymeric group comprising 25 or more carbon atoms, wherein at least one R^2 comprises at least one of (i) a polyalkylene group comprising 25 or more carbon atoms and (ii) a polyether group;

each Y^1 and Y^2 independently is a single bond or a heteroatom selected from the group consisting of O, S, and N; and

M is Ti, Sn, or $-Z^1-(X)_k-Z^2-$, wherein Z^1 independently is Ti or Sn, Z^2 independently is Ti or Sn, each X independently is O or $O-R^3-O$, wherein R^3 is an alkylene group, and k is 1, 2, or 3.

2. A blend material comprising a macrocyclic oligoester and the polymer-containing catalyst of claim 1, wherein the macrocyclic oligoester comprises a structural repeat unit of the formula



where A is an alkylene, a cycloalkylene or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group.

3. A polymer-containing catalyst prepared by chemically bonding a Ti-based catalyst or a Sn-based catalyst with one or more polymeric groups comprising 25 or more carbon atoms, wherein one or more of the one or more polymeric groups

comprises at least one of (i) a polyalkylene group comprising 25 or more carbon atoms and (ii) a polyether group.

4. A polymer-containing catalyst having the molecular formula

$$Ti\text{—}(OR)_4,$$

wherein each R independently is a polymeric group comprising 25 or more carbon atoms.

5. The polymer-containing catalyst of claim 4 wherein at least one R is a polyalkylene group comprising 25 or more carbon atoms.

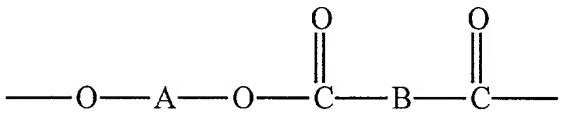
6. The polymer-containing catalyst of claim 5 wherein each R is selected from the group consisting of a polyethylene group, a poly(1,2-butylene) group, a poly(ethylene-ran-1,2-butylene) group, and a polyethylene-block-poly(ethylene glycol) group.

7. The polymer-containing catalyst of claim 4 wherein at least one R is a polyether group.

8. The polymer-containing catalyst of claim 7 wherein each R is selected from the group consisting of a poly(ethylene glycol), a poly(propylene glycol), and a polyethylene-block-poly(ethylene glycol) group.

9. The polymer-containing catalyst of claim 4 wherein at least one R is a polyalkylene group and at least one R is a polyether group.

10. A blend material comprising a macrocyclic oligoester and the polymer-containing catalyst of claim 4, wherein the macrocyclic oligoester comprises a structural unit of the formula



where A is an alkylene, a cycloalkylene, or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group.

11. A polymer-containing catalyst having the molecular formula

$$(R^1)_2\text{—}Sn\text{—}(OR^2)_2,$$

wherein:

each R^1 independently is, or two R^1 groups taken together are, an alkyl group or an alkyl ether group each having between 1 and 20 carbon atoms; and

each R^2 independently is a polymeric group comprising 25 or more carbon atoms.

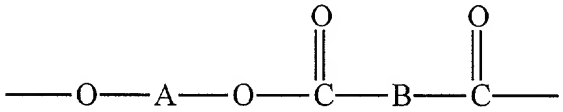
12. The polymer-containing catalyst of claim 11 wherein each R^1 independently is an alkyl group and at least one R^2 is a polyalkylene group comprising 25 or more carbon atoms.

13. The polymer-containing catalyst of claim 12 wherein R^1 is a butyl group and R^2 selected from the group consisting of a polyethylene group, a poly(1,2-butylene) group, a poly(ethylene-ran-1,2-butylene) group, and a polyethylene-block-poly(ethylene glycol) group.

14. The polymer-containing catalyst of claim 11 wherein each R^1 is individually an alkyl group and at least one R^2 is a polyether group.

15. The polymer-containing catalyst of claim 14 wherein R^1 is a butyl group and R^2 is selected from the group consisting of a poly(ethylene glycol), a poly(propylene glycol), and a polyethylene-block-poly(ethylene glycol) group.

16. A blend material comprising a macrocyclic oligoester and the polymer-containing catalyst of claim 11, wherein the macrocyclic oligoester comprises a structural unit of the formula



where A is an alkylene, a cycloalkylene, or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group.

17. A method of preparing a polymer-containing catalyst comprising the steps of:

(a) providing an organo-metal compound comprising an alkoxy metal moiety;

(b) providing a polymer comprising 25 or more carbon atoms, a hydroxyl group, and at least one of (i) a polyalkylene group and (ii) a polyether group; and

(c) contacting the organo-metal compound and the polymer, thereby producing a polymer-containing catalyst through the chemical reaction of the alkoxy metal moiety of the organo-metal compound and the hydroxyl group of the polymer.

18. The method of claim 17 wherein the metal of the organo-metal compound and the alkoxy metal moiety is titanium.

19. The method of claim 17 wherein the metal of the organo-metal compound and the alkoxy metal moiety is tin.

20. The method of claim 17 wherein the polymer comprises an unsubtituted polyalkylene group comprising 25 or more carbon atoms.

21. The method of claim 17 wherein the polymer comprises an unsubstituted polyether group comprising 25 or more carbon atoms.

22. The method of claim 17 wherein the polymer comprises a co-polymeric group.

23. The method of claim 17 wherein contacting the organo-metal compound and the polymer is conducted at ambient temperature.

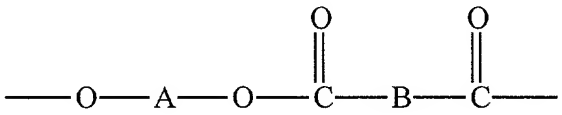
24. The method of claim 17 wherein contacting the organo-metal compound and the polymer is conducted at a temperature within a range from about 35°C to about 260°C.

25. The method of claim 17 wherein contacting the organo-metal compound and the polymer is conducted at a temperature within a range from about 100°C to about 200°C.

26. A mixture of reaction products prepared by the method of claim 17.

27. The mixture of claim 26 wherein the molar ratio of the polymer provided in step (b) and the organo-metal compound provided in step (a) is greater than 0 and less than or equal to 4.

28. A blend material comprising a macrocyclic oligoester and a polymerization catalyst, wherein the macrocyclic oligoester comprises a structural repeat unit of the formula



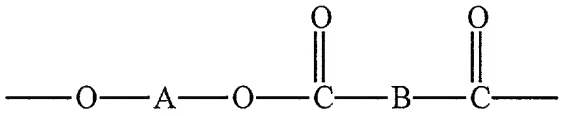
where A is an alkylene, a cycloalkylene, or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group, and wherein the polymerization catalyst comprises a polymeric group comprising 25 or more carbon atoms.

29. The blend material of claim 28 wherein the macrocyclic oligoester comprises macrocyclic co-oligoester.

30. The blend material of claim 28 wherein the polymerization catalyst comprises a polyalkylene group comprising 25 or more carbon atoms.

31. The blend material of claim 28 wherein the volume ratio of the macrocyclic oligoester to the polymerization catalyst is in a range from about 2:1 to about 50:1.

32. A method for polymerizing a macrocyclic oligoester comprising a structural repeat unit of the formula



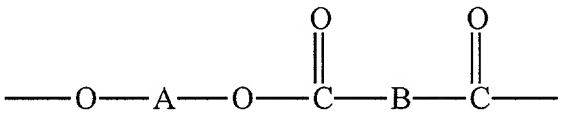
where A is an alkylene, a cycloalkylene, or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group, the method comprising the step of contacting, at an elevated temperature, a macrocyclic oligoester and a polymerization catalyst comprising a polymeric group comprising 25 or more carbon atoms.

33. The method of claim 32 wherein the polymerization catalyst comprises a polyalkylene group.

34. The method of claim 32 wherein the macrocyclic oligoester and the polymerization catalyst are components of a blend material.

35. A method for polymerizing a macrocyclic oligoester comprising the steps of

(a) providing a molten macrocyclic oligoester, wherein the macrocyclic oligoester comprises a structural repeat unit of the formula



where A is an alkylene, a cycloalkylene or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group;

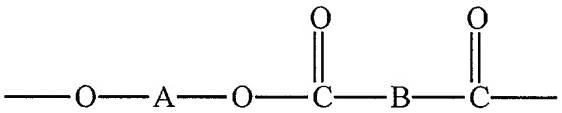
(b) providing a molten polymerization catalyst, the polymerization catalyst comprising a polymeric group comprising 25 or more carbon atoms; and

(c) contacting the molten macrocyclic oligoester and the molten polymerization catalyst, thereby causing polymerization of the macrocyclic oligoester.

36. The method of claim 35 wherein the contacting step (c) takes place in a mold.

37. A method for polymerizing a macrocyclic oligoester comprising the steps of

(a) providing a molten macrocyclic oligoester in a mixing chamber, wherein the macrocyclic oligoester comprises a structural repeat unit of the formula



where A is an alkylene, a cycloalkylene or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group;

(b) providing a molten polymerization catalyst of claim 1 in the mixing chamber;

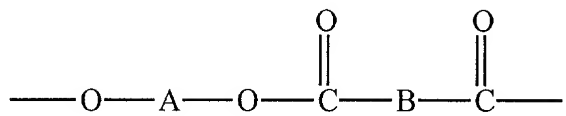
(c) mixing the molten macrocyclic oligoester and the molten polymerization catalyst in the mixing chamber; and

(d) introducing the mixed molten macrocyclic oligoester and the polymerization catalyst into a mold.

38. A polymer-containing catalyst prepared by chemically bonding a catalyst with one or more polymeric groups comprising 25 or more carbon atoms, wherein one or more of the one or more polymeric groups comprises at least one of (i) a polyalkylene group comprising 25 or more carbon atoms and (ii) a polyether group.

39. The polymer-containing catalyst of claim 38 wherein the catalyst contains a metal.

40. The polymer-containing catalyst of claim 38 wherein the catalyst catalyzes the polymerization of a macrocyclic oligoester, the macrocyclic oligoester comprising a structural unit of the formula



where A is an alkylene, a cycloalkylene, or a mono- or polyoxyalkylene group; and B is a divalent aromatic or alicyclic group.